

***Nymphaea* cults in ancient Egypt and the New World: a lesson in empirical pharmacology**

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Modern drugs used to treat erectile dysfunction act locally to facilitate penile smooth muscle relaxation, but a new generation of centrally acting agents is in clinical trials. One of these, apomorphine, a dopamine receptor agonist, was recommended in 2000 by a committee of specialists at the US Food and Drug Administration (FDA) as a treatment for impotence.¹ We describe here evidence that the treatment of erectile dysfunction with apomorphine is not new: the Mayans and ancient Egyptians were well acquainted with the clinical effects of an apomorphine-containing plant, and they probably used that plant as an aid to sexual activity.

Nymphaea caerulea (blue lotus) and *N. ampla*, which has a white flower but a similar alkaloid content, grow along lakes and rivers, thrive in wet soil, and bloom in the spring.² They belong to the water-lily family. Another variety is *N. lotos*, sometimes called the 'white lotus' though not a true lotus. The isolation of the psychoactive apomorphine from *Nymphaea* species³ has offered chemical support to speculation that *Nymphaea* species may have been employed as hallucinogens in both the Old and the New World.^{4,5} The use of *N. caerulea* and of *N. lotos* in rites and rituals is depicted in the frescoes within the tombs, and in very early papyrus scrolls. The most important of these was the scroll of Ani (*Book of the Dead*). *Nymphaea* is mentioned and represented in several chapters of the book, always tied to magical-religious rites. Depictions of *Papaver somniferum* and mandragora, also known as mandrake, a hallucinogenic plant with anticholinergic properties, often appear alongside those of *Nymphaea*.⁶ Tutankhamon's tomb contained a gold-plated shrine decorated with a bas-relief of a pharaoh holding a huge *Nymphaea* and two mandragoras in his left hand.

Nymphaea flowers were also depicted in frescoes from the tomb of Nebamun (XVIII Dynasty, 1370–1318 BC) found in Luxor, and now located in the British Museum. The frescoes illustrate a ritualistic funeral dance with two

male dancers accompanied by three women, garlanded with petals of *N. caerulea*. The women are offering vases, from which golden emanations flow as if they contained a magical fluid. *Nymphaea* species also feature in erotic cartoons (Figure 1).

Similar motifs are seen in Mayan art, and Dobkin de Rios,⁷ Diaz,⁸ and Emboden^{9,10} hypothesize that the plants were used as hallucinogens during religious rites or as 'entheogenes', symbolic of a union between man and the divine. In a vase found in the Classic period Mayan site of Bonampak, the headpiece of the central figure depicts a character adorned with a *Nymphaea*, performing a ritual dance. In the Mayan ruins of Palenque, also in Chiapas, Mexico, a bas-relief in the tomb of Pacal, in the Temple of Inscriptions, contains a representation of two Mayan priests standing on either side of 'jaguar god'. One of the priests has a *Nymphaea* bud emerging from his head, and the other has the same bud emerging from his headpiece. Such striking similarities in such distant cultures lead to the conclusion that the plants had a common use. Studies from several different laboratories have identified apomorphine



Figure 1 Detail from erotic cartoon (Turin papyrus 55001), showing 'lotus' over the head of woman, possibly symbolizing her powers of arousal. Reproduced by permission from Manniche L, *Sexual Life in Ancient Egypt* (London, New York, Bahrain; Kegan Paul, 2002)

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and aporphine in the bulbs and roots of *N. ampla*.¹¹ The emetic effect of apomorphine (and aporphine, which is hydroxylated in the body to form apomorphine) is well known. Mescal beans, ritually used by shamans to induce an ecstatic states are likewise emetic; it has been hypothesized that *Nymphaea* was used by both Egyptian and Mayan cultures as a purifying ritual emetic.¹¹ However, it has only recently become clear that apomorphine can be utilized, with excellent results, to treat erectile dysfunction. It is a centrally acting, selective D₁/D₂ dopamine agonist, and activation of dopaminergic receptors in the paraventricular nucleus of the hypothalamus initiates a cascade of events, ultimately resulting in smooth muscle relaxation and vasodilatation within the corpora cavernosa, leading to penile erection.^{12,13}

This discovery provides a likely explanation for the appearance of *Nymphaea* in the Luxor fresco and in erotic cartoons such as that reproduced in Figure 1. The fact that temple drawings only depict use by the higher castes, such as priests and royalty, suggests that the masses did not benefit from this discovery. The *Nymphaea* story serves as a further illustration of how the effects of substances of plant origin were known even though the discoverers lacked the technology to explain them.^{14,15}

REFERENCES

- 1 Gottlieb S. FDA committee recommends approval for Viagra rival. *BMJ* 2000;**320**:1094
- 2 Berst T. *Blue Lotus*. Philomath, OR: American Health & Herbs Ministry, 2001
- 3 Diaz JL. Algunas plantas mexicanas con efectos sobre el sistema nervioso. In: (Xavier Lozoya L, ed.) *Estado Actual del Conocimiento en Plantas Medicinales Mexicanas*. Instituto Mexicano Para el Estudio de las Plantas Medicinales, 1976:109–23
- 4 Schultes ER, Hofmann A. *Plants of the Gods*. Rochester: Healing Art Press, 1987
- 5 Emboden WA. The ethnobotany of the Dresden Codex with especial reference to the narcotic *Nymphaea ampla*, Vol. 27. Cambridge: Botanical Museum Leaflets, Harvard University, 1983:87–132
- 6 Edwards IES. *Tutankhamun: his Tomb and its Treasures*. New York: Knopf, 1976
- 7 Dobkin de Rios M. The influence of psychotropic flora and fauna in Maya religion. *Curr Anthropol* 1974;**15**:147–64
- 8 Diaz JL. Ethnopharmacology of sacred psychoactive plants used by the Indians of Mexico. *A Rev Pharmacol Toxicol* 1977;**17**:647–75
- 9 Emboden WA. *Nymphaea ampla* and other narcotics in Maya drug ritual and religion. *Mexicon* 1979;**1**:50–2
- 10 Emboden WA. Transcultural use of narcotic water lilies in ancient Egyptian and Maya ritual. *J Ethnopharmacol* 1981;**3**:38–83
- 11 Marozzi E, Mari F, Bertol E. *Le Plante Magiche. Viaggio nel fantastico mondo delle droghe vegetali*. Firenze: Lettere Editore, 1996
- 12 Dula E, Bukofzer S, Perdok R, George M. Double-blind, crossover comparison of 3 mg apomorphine SL with placebo and with 4 mg apomorphine SL in male erectile dysfunction. *Eur Urol* 2001;**39**: 558–64
- 13 Montorsi F, Perani D, Anchisi D, et al Apomorphine-induced brain modulation during sexual stimulation: a new look at central phenomena related to erectile dysfunction. *Int J Impot Res* 2003;**15**:203–9
- 14 Manniche L. *An Ancient Egyptian Herbal*. London: British Museum, 1989
- 15 Manniche L. *Sexual Life in Ancient Egypt*. London, New York, Bahrain: Kegan Paul, 2002